

EM and a Changing Environment

Future Challenges for Deactivation and Decommissioning

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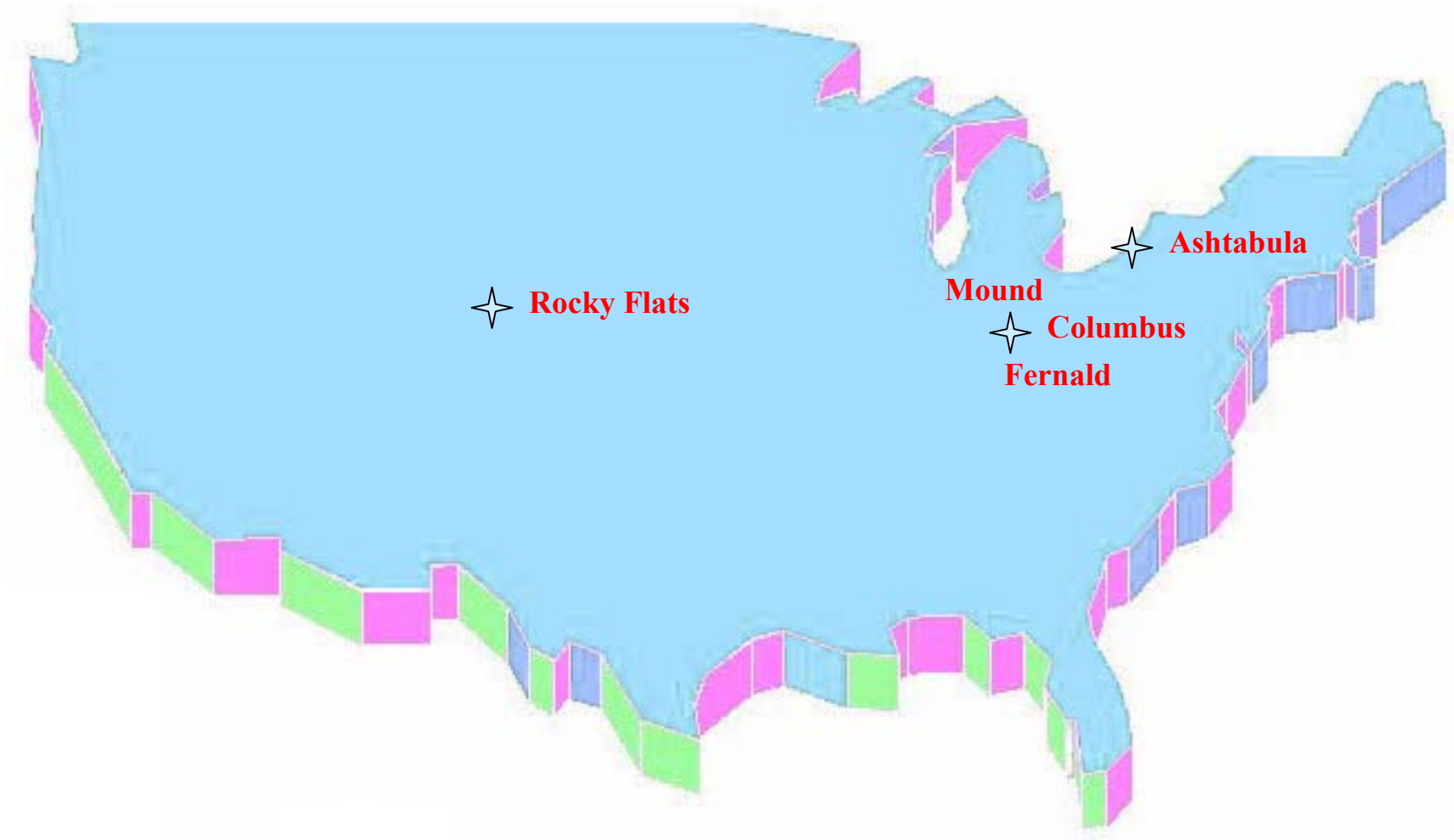
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If We Only Had a Crystal Ball!

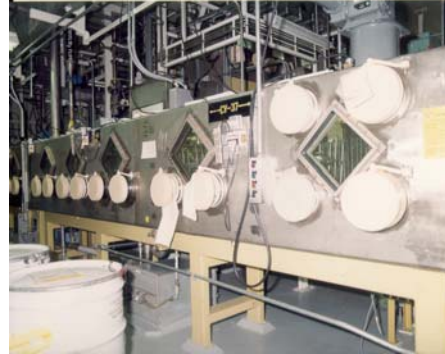


Supporting Closure Sites



Rocky Flats

Unique Challenges - Unique Solutions



Small Gloveboxes being size reduced in a centralized location with the Inner Tent Chambers



Large Gloveboxes cannot be taken to a central facility, so they must be sized reduced in place

Recent Accomplishments at Rocky Flats

- **Effective/Safe Size Reduction and Packaging of Equipment**
 - Staged improvements of size reduction systems to reduce worker injury and rad exposure ~ savings \$ 9 million
- **Decontamination and Measurement Systems for Surface Contaminated Objects**
 - 3-stage decon, high-rad instrumentation, and packaging technologies have maximized disposal as SCO waste eliminating costly size reduction ~ savings \$ 106 million
- **Certification System for Larger TRU Waste Container**
 - “SuperHENC” neutron assay system to certify Standard Waste Boxes for disposal at WIPP ~ savings \$ 141 million



Addressing Rocky's #1 Challenge - Beryllium

- **Supporting deployment of instrumentation for real-time air monitoring and in-building readings of swipes and filters for beryllium**
 - Contract to Amzil, Inc for a beryllium air monitor
 - Contract SEA to test a real-time monitor that utilizes microwave plasma and spectrometry to analyze swipes
 - Assess new LANL real-time technique for detection of surface contamination (support for preparation, testing, calibration and validation of method)



Future Challenges at Rocky Flats

- **Characterization of plutonium under paint**
- **Vacuum removal of raschig rings**
- **Size reduction of thick items**
- **Sludge removal/decontamination**
- **Duct Compaction**
- **Remote in-situ size reduction**
- **Structural foam for shipping**
- **Remote decontamination of ducts**
- **Characterization for SCO w/ external measurements**
- **Equipment encapsulation**

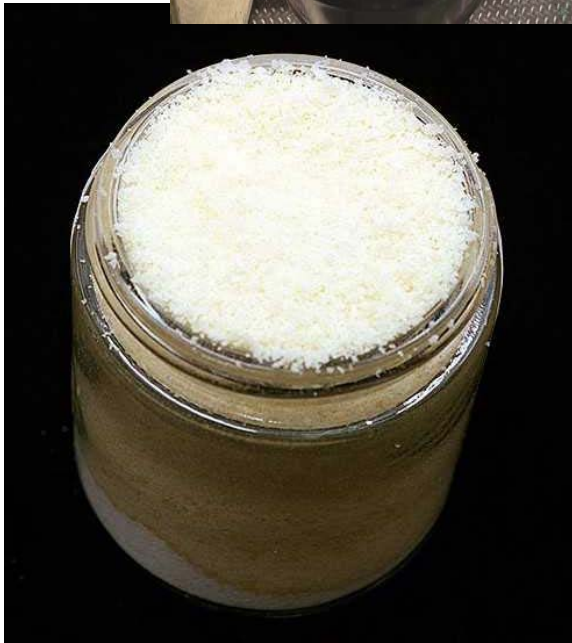


Recent Accomplishments at Mound

- **Completed Tritium Facility LSDDP**
- **Improved non-invasive and invasive techniques for characterization of the “Old Cave”**
- **Initiated Mound LTS Initiative**



Solving High-Priority Needs at Mound has Impact Across the Complex



- **Nochar PetroBond® oil solidification polymer cost-effectively solidifies tritium-contaminated vacuum pump oils**
 - deployments at: Mound, Ashtabula, Columbus, Rocky Flats, LANL, Sandia, WTC ground zero & Whiteshell Laboratory, Atomic Energy of Canada
 - planned deployments in Russia & Romania
- **SRS evaluating Nochar for treatment of 37,000 gallons of PUREX waste**
 - potential savings \$91 million

Future Challenges at Mound

- **Monitoring for Metal Tritides**
- **Decontamination and Size Reduction Techniques for Tritiated Gloveboxes**
- **Control of Loose Surface Contamination**
- **Dust and Surface Contamination Control**
- **Tank Sludge Removal/Solidification**
- **Robotic Characterization of Stacks**



Improved Measurement and Monitoring Systems Helping Fernald Put Safety First

- **Prismless Total Survey Station**

- Leica system now used daily at Fernald for safe, cost-effective surveying
- reduces labor & PPE requirements
- estimated savings ~\$370,500

- **Wireless Physiological Monitoring**

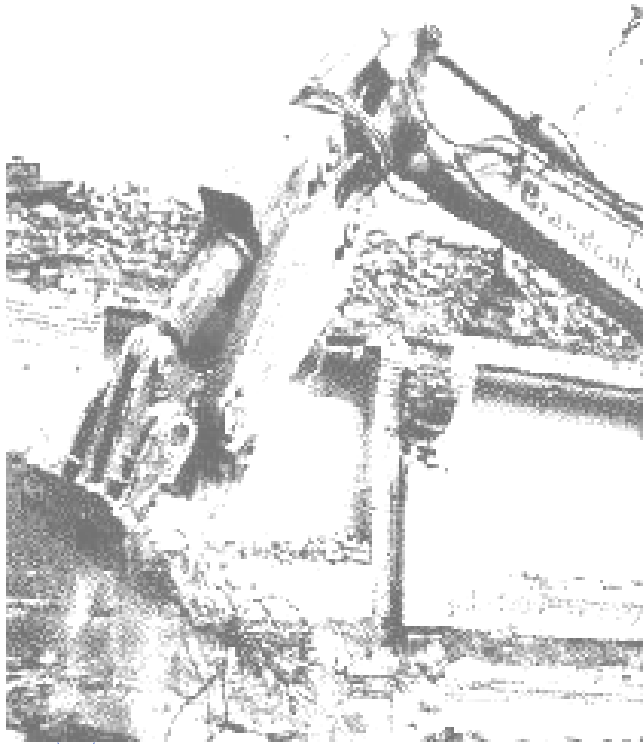
- Siemens/Framatome system will measure and collect vital sign information for multiple workers simultaneously
- estimated savings ~\$127,300

- **Wireless Integrated Radon Monitor**

- deployment of Campbell Scientific unit in November 2001
- additional units purchased; estimated savings ~\$775,000



Reducing Waste Volumes & Solving High-Priority Needs at Fernald



- **Universal Demolition Processor**

- 15,000 cubic yards of aggregate needed per year to support transportation infrastructure
- recycling concrete saves money & reduces waste
- completed processing of 16 concrete pads & structures containing approximately 2,300 cubic yards of concrete
- locations targeted for concrete processing include 10A-Precipitator Pad (north and south), 10C Pad, Clearwell, and 12A Pad; containing over 2,200 cy of concrete
- estimated LCC savings \$11 million

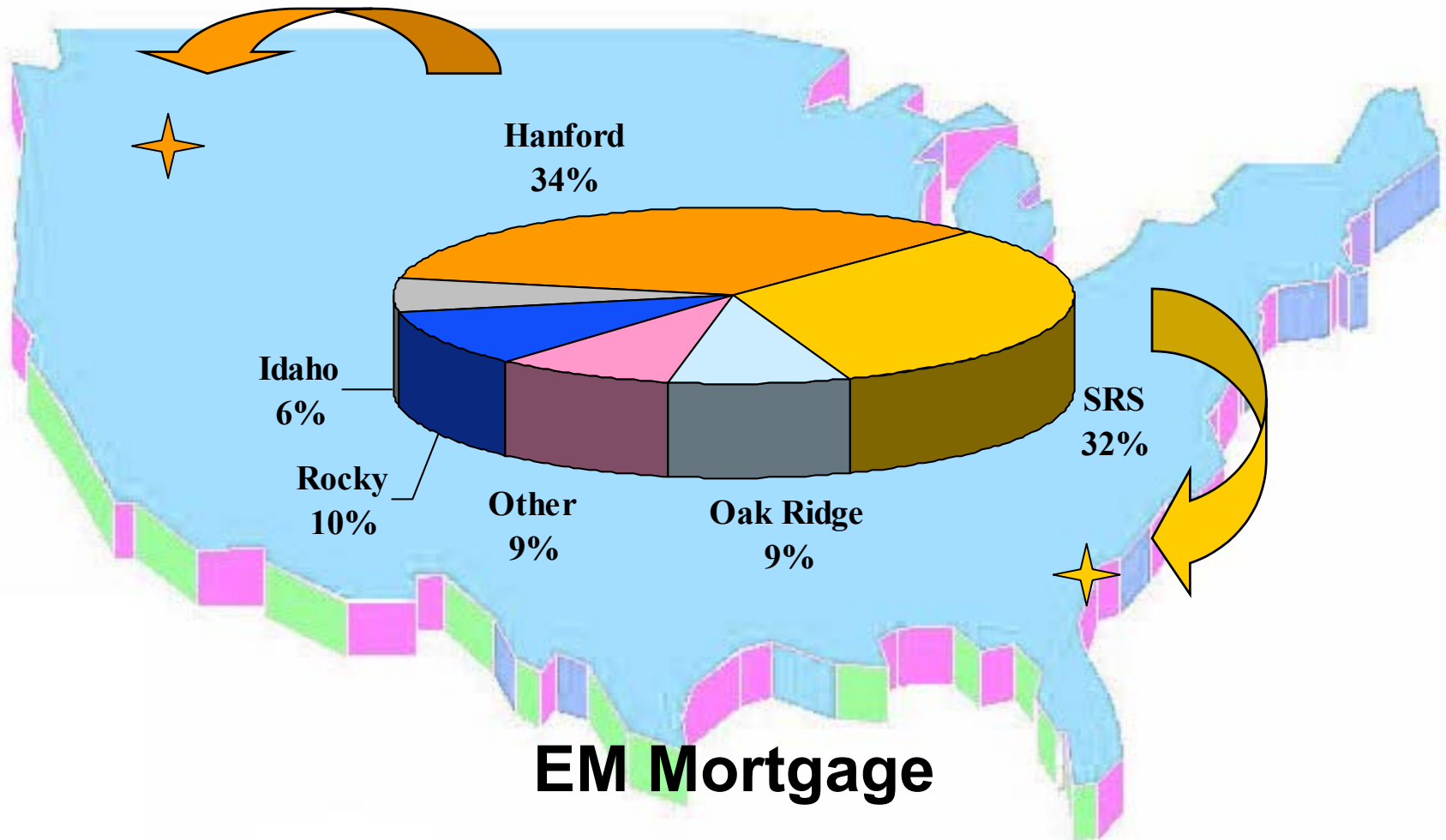


Future Challenges at Fernald

- **Air Monitoring for Thorium Dose**
- **Enhanced Real-Time Personnel Monitoring for Radon**
- **Identification of residual liquid in piping, equipment and tanks**
- **Improved method of cutting stainless steel equipment and tanks**



High Risk/High Cost Baselines



EM Mortgage
~ \$14 Billion

Seeking Alternatives for High Risk/High Cost Baselines

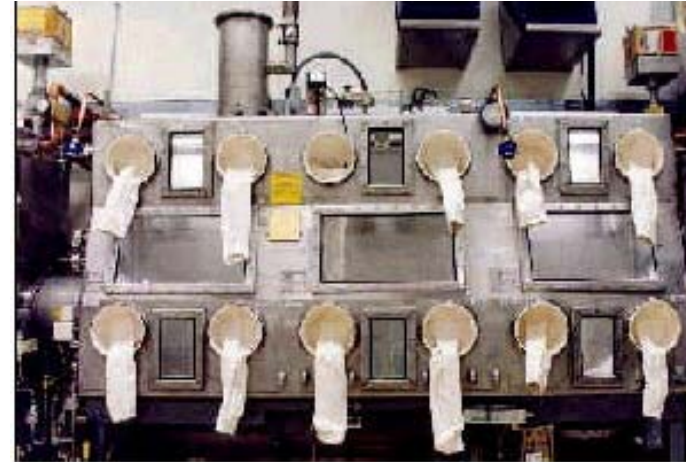
- **Plutonium Processing Facilities**
- **Hot Cells**
- **Gaseous Diffusion Plants**
- **Chemical Processing Facilities “Canyons”**



Plutonium Processing Facilities

Problem

- kilogram quantities of Pu held up in some process equipment and ducts needs to be safely removed before further D&D can take place
- contaminated structures, thousands of gloveboxes and miles of piping and duct systems require decon to below TRU



Strategic Sites

- Hanford's 200 Area including 233-S and the PFP complex
- Rocky Flats Pu processing facilities (e.g., Building 776/777)
- Other major sites include LANL and SRS

Hot Cell Facilities

Problem

- typically have very high radiation fields (tens to hundreds of R/hr)
- storehouses for other highly contaminated equipment & debris
- congested, limited access and extremely dangerous environments



Strategic Sites

- Hanford's 300 Area (e.g., 324 & 327 Bldgs)
- West Valley Head End Cells
- Battelle West Jefferson JN-1 building hot cells
- Hot cells also at LANL, INEEL and most national labs

Gaseous Diffusion Plants



Strategic Sites

- Oak Ridge K-25 & K-27 D&D
- June 2001 Portsmouth enrichment operations placed in cold standby; D&D of some excess facilities will be accelerated
- D&D of the Paducah GDP is not anticipated to begin until near FY2020.

Problem

- the majority of existing legacy material is inventoried at the gaseous diffusion plants
- future D&D activities at the GDPs will generate waste materials that dwarf the existing scrap piles.



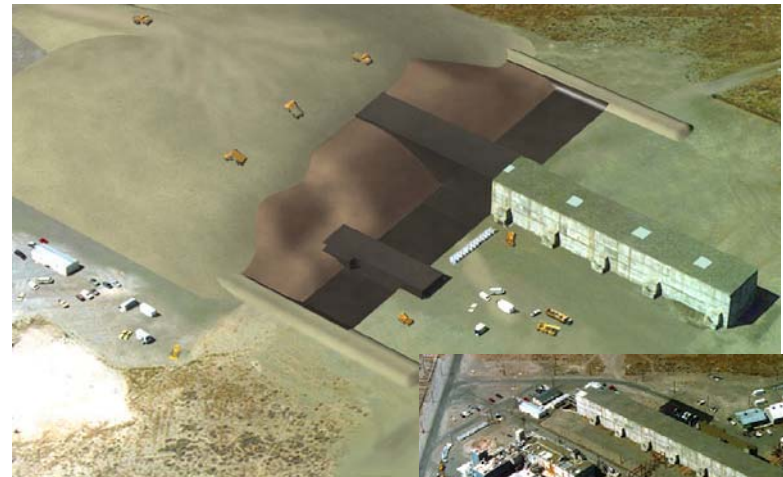
Reprocessing Facilities “Canyons”

Problem

- massive, highly contaminated facilities with large volumes of contaminated processing equipment
- aging structures having undergone varying degrees of deactivation
- SRS canyons still operating, end states undetermined
- until deactivation and final disposition occurs, extensive and costly S&M is required

Strategic Sites

- Hanford’s 200 Area canyons (e.g., U, T & B Plants)
- SRS; F and H facilities
- Idaho HPP/CPP-640, West Valley CPC, SPRU



Developing Core Technologies

- In 2001, the National Research Council identified four areas for D&D research investments:
 - 1) characterization of contaminated materials
 - 2) decontamination of equipment and facilities
 - 3) remote intelligent systems to improve worker safety
 - 4) end state definition for facility D&D



NETL Applied Research Response

- **NETL has issued an applied research call that included the first three topic areas identified by NRC**
- **Proposals solicited from industry, universities and national labs**
- **NETL call was much broader; ten topic areas were included within the applied research solicitation**



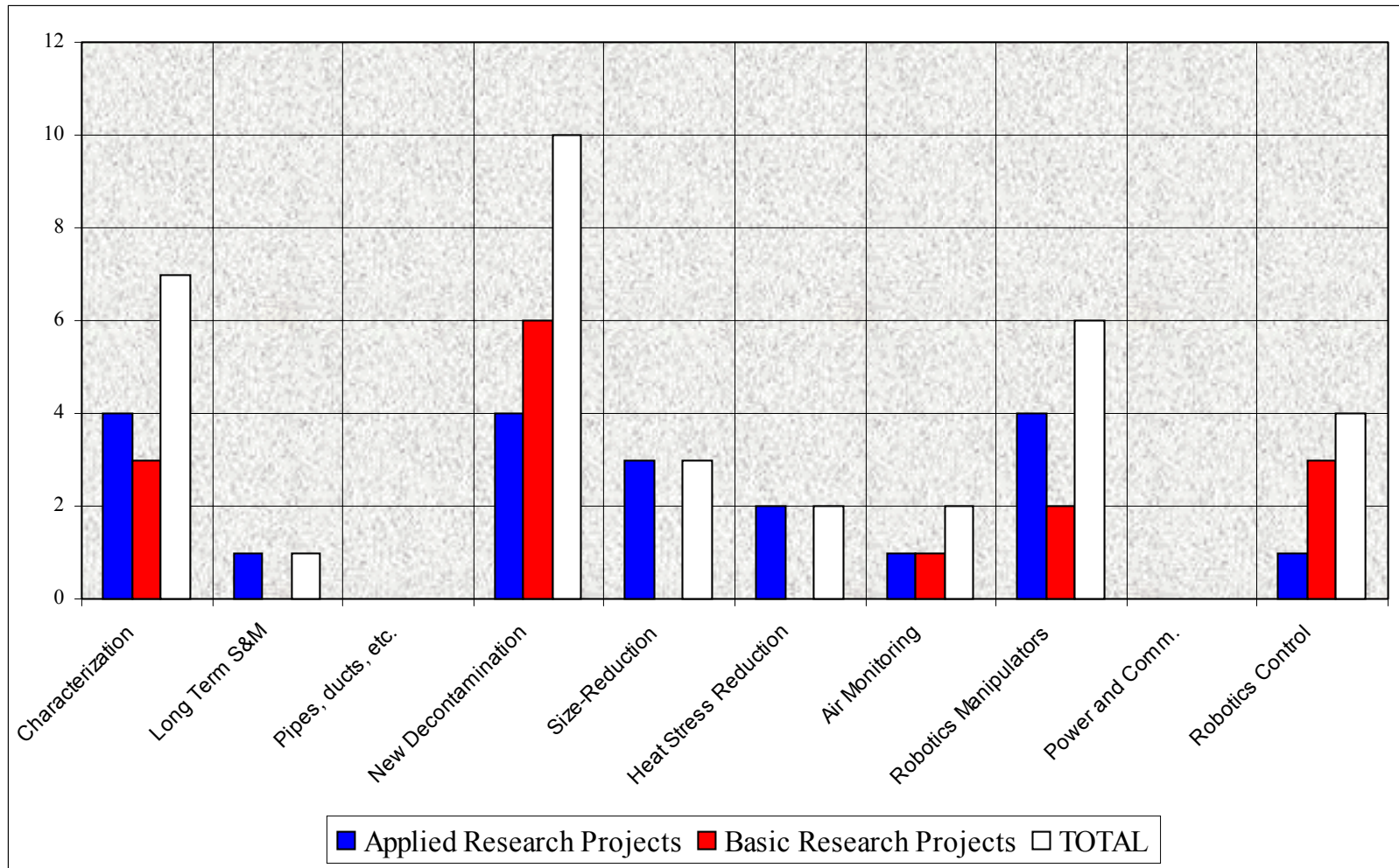
Applied R&D Topic Areas

| Topic Area | Applied Research Projects | Basic Research Projects |
|--|---------------------------|-------------------------|
| Improvements to Characterization Technology | 4 | 3 |
| New Systems for Long Term Surveillance and Maintenance | 1 | 0 |
| New Characterization Techniques for Pipes, Ducts, Tanks, etc. | 0 | 0 |
| Next Generation Decontamination Technology for Metals & Concrete | 4 | 6 |
| Improved Size-Reduction and Demolition Technologies | 3 | 0 |

Applied R&D Topic Areas (continued)

| Topic Area | Applied Research Projects | Basic Research Projects |
|--|---------------------------|-------------------------|
| Technologies for Worker Heat Stress Reduction | 2 | 0 |
| Improved Air Monitoring Technology and Contamination Control | 1 | 1 |
| Advanced Manipulators and End Effectors | 4 | 2 |
| Tetherless Power and Communications Systems | 0 | 0 |
| Sensor- based Manipulator Control Systems | 1 | 3 |

Applied R&D Topics (continued)



Back to the Future

